Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Claims 1 – 14 (cancelled)

Claim 15 (currently amended): A method of laser beam welding comprising:

a) employing a shielding gas mixture, said mixture comprising nitrogen and helium;

b) employing a laser beam, wherein the laser power of said laser beam is between about 0.5 kW and about 30 kW.

~~b)~~ c) adjusting the composition of said mixture in relation to the power or power density of said laser beam; and

~~c)~~ d) increasing the proportion of helium in said mixture when said laser power or density is increased.

Claim 16 (cancelled)

Claim 17 (currently amended): The method of claim ~~16~~ 15, wherein said laser power is between about 5 kW and about 20kW.

Claim 18 (previously presented): The method of claim 15, wherein said mixture consists essentially of nitrogen and helium.

Claim 19 (previously presented): The method of claim 15, further comprising mixing said nitrogen and said helium on site to produce said mixture.

Claim 20 (previously presented): The method of claim 15, further comprising:

a) producing said mixture with a gas mixer means; and

b) controlling said mixing means in response to fluctuations in said laser power or power density.

Claim 21 (previously presented): The method of claim 15, wherein said gas mixture further comprises a helium volume proportion of about 30% to about 80%.

Claim 22 (previously presented): The method of claim 21, wherein said mixture consists essentially of:

a) a helium volume proportion of about 30% to about 80%; and

b) a nitrogen volume proportion of about 20% to about 70%.

Claim 23 (previously presented): A method of laser beam welding comprising:

a) employing a shielding gas mixture, said mixture further comprising nitrogen and helium; and

b) adjusting the proportion of helium to nitrogen in said mixture based upon the power or power density of said laser beam in order to minimize plasma formation in said mixture during welding.

Claim 24 (previously presented): A method of laser beam welding with a shielding gas mixture, said mixture comprising helium and nitrogen, wherein the volume proportion of said helium in said mixture further comprises at least one member selected from the group consisting of:

a) about 1% to about 30% for a laser beam power of about 0.5 kW to about 4 kW;

b) about 30% to about 50% for a laser beam power of about 4 kW to about 8 kW; and

c) about 50% to about 70% for a laser beam power of about 8 kW to 12 kW.

Claim 25 (previously presented): A method for laser beam welding with a shielding gas mixture, said mixture comprising helium and nitrogen, wherein the volume proportion of said helium in said mixture further comprises at least one member selected from the group consisting of:

a) about 1% to about 30% for a laser beam power density of about 500 kW/cm^2 to about 2000 kW/cm^2;

b) about 30% to about 50% for a laser beam power density of 2000 kW/cm^2 to about 4000 kW/cm^2; and

c) about 50% to about 70% for a laser beam power density of 4000 kW/cm^2 to about 10000 kW/cm^2.

Claim 26 (previously presented): The method of claim 15, further comprising:

a) pre-mixing said helium and said nitrogen to the desired proportions; and

b) supplying said helium and said nitrogen from a single gas source.

Claim 27 (cancelled)

Claim 28 (previously presented): A method of laser beam welding with a shielding gas mixture comprising helium and nitrogen, wherein the volume proportion of said helium in said mixture is a function of the power density such that:

$$28 \times \ln(\Phi_P) - 207 \leq \%He \leq 32.3 \times \ln(\Phi_P) - 207$$

wherein:

a) $\ln(\Phi_P)$ represents the natural logarithm of said power density expressed in kW/cm^2; and

b) %He represents the volume percentage of helium in nitrogen of said gas mixture.

Claim 29 (previously presented): The process of claim 28, wherein said volume proportion of said helium in said mixture is a function of said power density such that:

$$28.5 \times \ln(\Phi_P) - 207 \leq \%He \leq 31.5 \times \ln(\Phi_P) - 207.$$

Claim 30 (previously presented): The process of claim 29, wherein said volume proportion of said helium in said mixture is a function of said power density such that:

$$29 \times \ln(\Phi_P) - 207 \leq \%He \leq 31 \times \ln(\Phi_P) - 207.$$